ADMINISTRATIVE INFORMATION:

- Effective Date: This Engineering Instruction (EI) is effective for projects submitted for letting on or after January 1, 2017.
- Superseded Issuances: None.
- Disposition of Issued Materials: The revisions issued with this EI will be incorporated into a future update of Highway Design Manual (HDM) Chapter 11 Signs, Signals and Delineation.

PURPOSE: The purpose of this EI is to announce guidance expanding the use of Secondary Highway Audible Roadway Delineators (SHARDS), a.k.a. shoulder rumble strips, on uncontrolled and partially controlled access state owned and maintained highways (non-freeways).

TECHNICAL INFORMATION: This EI is being issued in conjunction with EI 16-015 Revision to Standard Specification §649 - Audible Roadway Delineators and EB 16-030 New Standard Sheet 649-04 (M649-4) - Secondary Highway Audible Roadway Delineators (SHARDS).

Projects paving 0.75” (19 mm) or more on eligible highway sections should either include SHARDS or have SHARDS placed by the end of the following construction season. SHARDS may be installed on older pavements provided the shoulder surface in the area to be milled for the SHARDS does not have more than a single longitudinal crack and does not have any secondary cracking, patching or loose pieces of asphalt, as determined by the Regional Materials Engineer.

SHARD-Eligible Highway Sections:

- **Lane Width:** Consistent with EI 13-021 Requirements and Guidance for Pavement Marking Operations - Required Installation of CARDs and Travel Lane and Shoulder Width Adjustments, the travel lane width after any restriping should be 11’ (3.3 m) or more.
- **Shoulder Width:** To provide for adequate bicycle maneuvering beyond the rumble strip, rumble strips should not be installed on shoulders under 6’ (1.8 m) in width since they do not provide width for the offset to the rumble strip, the 12” (300 mm) rumble strip width, and a remaining 4’ (1.2 m) paved shoulder for cyclists. Exceptions may be made where:
  - there is an accessible, parallel bicycle facility within 200’ (60 m)
  - there is a run-off-the-road crash problem based on a site-specific crash analysis, or the facility prohibits cycling
- **Length:** The total quantity of SHARDS in a project is 5,000’ (1,500 m) or more. Because of the cost of mobilizing the equipment to mill in the SHARDS, projects that would result in the total placement of less than 5,000’ (1,500 m) may be exempted. Milling work that extends beyond the limits of the paving project should be considered.
• Speed: The posted speed is 50 mph (80 km/h) or greater. The likelihood of a severe injury or fatality increases dramatically in collisions of 45 mph (70 km/h) or greater. 50 mph (80 km/h) was chosen since some reduction in speed is anticipated when a vehicle leaves the road prior to a collision with a fixed object.

• Volume: A current AADT of 2,000 vpd or more. As traffic volumes decrease, the likelihood of collisions decreases, with or without the use of SHARDs.

• Roadway Width: The combined width of the lane(s) and shoulder, in each direction, must be at least 17’ (5.2 m).

• Longevity: Shoulders are not likely to be repaved within 3 years of the SHARDs placement.

• Exceptions: The requirement to install SHARDs may be waived by the Deputy Chief Engineer (Design) for eligible highway segments that do not have a higher than average history of run-off-the-road crashes and are located within 1,000 feet of a residential neighborhood.

Scoping Stage:

• Project Costs: Cost impacts are expected to be minor overall. However, on paving projects where SHARDs are used, they may constitute as much as a 1-5% increase in the project cost.

• Pavement Treatment: Where 1R paving (as defined in HDM Chapter 7) is performed, a 1” (25 mm) or thicker pavement is preferred. However, SHARDs have been successfully milled into thin surface treatments including 0.75” (19 mm) thick HMA top course, chip seal, microsurfacing and as part of SHARD-only contracts.

• SHARD-Only Contracts: SHARDs may be installed as stand-alone projects on existing pavements that meet the implementation criteria above.

• Funding: Dedicated SHARD projects are 100% HSIP fund eligible, including any work zone traffic control; temporary, interim and permanent pavement marking to adjust the shoulder width for SHARDs; mobilization, etc.. SHARDs and the pavement markings to adjust shoulder widths are 100% HSIP fund eligible as a separate share in other projects.

Design Stage:

• Plans: The plans should include a Table of Shoulder Rumble Strips indicating the starting and ending stations. Gaps and exclusions 300’ (100 m) or more in length should be identified in the table. Gaps and exclusions under 300’ (100 m) in length are paid for under Item 649.21 and do not need to be detailed in the table. Gaps and exclusions less than 300’ (100 m) in length are not to be deducted from the amount estimated for under Item 649.21.

• Dimensions and Location: Refer to the 649 Standard Sheets.

• Fog Sealing: Fog sealing, under Item 407.01120007, may be applied to the SHARDs or, where the shoulder is a candidate for fog sealing, the SHARDs and the shoulder.

• Project Coordination: Locations for stand-alone SHARD projects should be coordinated with paving work to avoid resurfacing over newly milled rumble strips.

• Public Outreach: In areas near residential neighborhoods and in urban areas, public outreach should be conducted with local officials and residents to communicate the benefits of SHARDs and to address questions or concerns. A brochure on SHARDs is posted on the Department’s Internet web page on SHARDs.

Construction Stage:

• Gaps: Prior to milling, the Contractor shall obtain EIC approval on where SHARDs are to be installed and where required gaps are to be included. Refer to the 649 Standard Sheets.

• Reporting: Project managers should e-mail the location of new SHARD installations to the
Regional Traffic Safety and Mobility group so the location may be entered into the Project Support System (PSS) or the Post Implementation Evaluation System (PIES) for evaluation.

IMPLEMENTATION: These changes may be incorporated into projects let prior to the Effective Date.

TRANSMITTED MATERIALS: No materials are transmitted with this EI. The specification changes may be found with EI 16-015 Revision to Standard Specification §649 - Audible Roadway Delineators, and the new standard sheet may be found with EB 16-030 New Standard Sheet 649-04 (M649-4) - Secondary Highway Audible Roadway Delineators (SHARDS). These changes will be incorporated into the Standard Specifications that will be effective on January 1, 2017.

BACKGROUND:

Safety: NYSDOT began experimental use of shoulder rumble strips in 1981 and made them a common feature on access-controlled highways starting in 1995. Placement was limited to freeways. As anticipated, rumble strips produced significant reductions in freeway drift-off-road injuries and fatalities, averaging around 60% in New York State. While other states also showed positive results, New York’s results were better than most.

A number of states began using shoulder rumble strips on secondary highways. NCHRP Report 641, “Guidance for the Design and Application of Shoulder and Centerline Rumble Strips,” summarized the accident reduction experience of three states (Minnesota, Missouri, and Pennsylvania) where significant amounts of shoulder rumble strips had been placed, and where accident records were sufficient to distinguish trends. The results varied widely but the researchers concluded that “…the average safety effects of installing milled shoulder rumble strips on … rural two-lane roads…are estimated to be … 36-percent reduction in single vehicle run-off-road fatal and injury accidents.” No noticeable increase in bicycle fatalities or serious injuries was reported where shoulder rumble strips were used. SHARDS were also tested for motorcyclist safety by MnDOT as part of K. W. Miller, Effects of Center-Line Rumble Strips on Non-Conventional Vehicles, 2008, and found to “add no measurable risk to motorcyclists.”

The benefit to cost ratio for SHARDS has been calculated at over 36:1. Based on the use limitations specified in this EI, SHARDS would qualify for approximately 2,800 miles (=2.5%) of the highways in the state and, if used on all such highways, are calculated to save 40 lives and avert nearly 2,000 injuries every ten years.

Noise: A Noise Analysis Report for CARDs on NYS Route 77 & NYS Route 441, completed in November 2013, concluded that the rumble strips do not significantly impact noise levels. The results are consistent with studies performed by other states. However, vehicles running longitudinally along rumble strips produce noise that may be an annoyance, similar to a motorcycle or truck. Therefore, the criteria for speed, volume, rural character, minimum lane widths, etc., have been developed to improve safety while minimizing noise impacts.

Bicyclists: Concerns identified for bicyclists riding over rumble strips included discomfort or destabilization; encroachment of the rumble strips onto the rideable road shoulder, and the inability to transition from the travel lane to the shoulder, as necessary, to avoid debris, allow traffic to pass, etc. To address these concerns, a rumble strip design was developed to minimize inconvenience or periodic discomfort to bicyclists.

To permit bicyclists to cross between the shoulder and the travel lane without having to ride on the SHARD depressions, systematic gaps shall be included in the run of rumble strips. The gaps are 12’ (3.6 m) long and spaced at 60’ (20 m) intervals, 48’ (16.4 m) between gaps. Where one of these
systematic gaps would be within 10’ (3 m) of one of the required gaps described below, the systematic gap should not be left and the milling should continue to the required gap. Required gaps are provided:

- Across commercial driveways so that bicyclists do not have to cross rumble strips when passing in front of a vehicle that has blocked the shoulder while waiting for a break in traffic. These gaps should start 30’ (9 m) prior to the driveway opening.
- Through highway intersections or where the strips would be crossed by turning or merging lanes, as vehicles should not have to encounter shoulder rumble strips within the normal traveled way.
- Through crosswalks, as pedestrians should not have to traverse any extra pavement unevenness.

Lateral Positioning to Minimize Interference with Bicyclists Use of Shoulders:

- The rumble strips are placed 6” to 12” (150 mm to 300 mm) outside the traveled-way to reduce incidental contact with the rumble strip. For bicyclist accommodation, the remaining width of the shoulder will be 4’ (1.2 m) or greater.

Cost Impact: The cost of SHARDS are expected to be comparable to recent average prices of CARDs, and to reflect a similar variation in cost relative to the length of the installation (i.e., lower “per foot” costs for greater installation lengths).

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<th>Average Price of CARDs (2014)</th>
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REFERENCES:


CONTACT: Direct questions from Operations regarding this issuance to Robert Limoges, P.E. of the Office of Traffic Safety and Mobility at (518) 457-2452 or via e-mail at Robert.Limoges@dot.ny.gov. Direct questions on shoulder conditions to Chris Euler, P.E. of the Materials Bureau at (518) 457-4581 or via e-mail at Chris.Euler@dot.ny.gov. Direct all other questions to Richard D. Wilder, P.E. of the Design Services Bureau at (518) 457-5922 or via e-mail at Rick.Wilder@dot.ny.gov.